

AMENDMENT OF REQUEST FOR APPLICATION/MODIFICATION OF ASSISTANCE AGREEMENT

1. AMENDMENT/MODIFICATION NO.
2

2. EFFECTIVE DATE

3. REQUISITION NO.

4. ISSUED BY

Lori J. Anderson
Bureau of Land Management
5001 Southgate Drive, PO Box 36800
Billings, Montana 59107-6800
406-896-5196

5. ADMINISTERED BY (If other than Item 4.)

6. NAME AND ADDRESS OF RECIPIENT (No., street, county, state, and ZIP)

University of Montana
Office of Research and Sponsored Programs
University Hall 209
Missoula, Montana 59812-4101

(T)

7A. AMENDMENT OF REQUEST FOR APPLICATION NO.

7B. DATED

XX

8A. MODIFICATION OF ASSISTANCE AGREEMENT NO.
ESA04I010, Task Order #1

8B. DATED 07/08/2004

9. THIS ITEM APPLIES TO AMENDMENTS OF REQUEST FOR APPLICATION

The above numbered Request is amended as set forth in Item 10. The hour and date specified for receipt of Applications is extended, is not extended.
Applicants must acknowledge receipt of this amendment prior to the hour and date specified in the Request or as amended, by one of the following methods:

a) By completing Items 6 and 13, and returning ___ copies of the amendment; b) By acknowledging receipt of this amendment of each copy of the Application submitted; or c) By separate letter or telegram which include reference to the Request for Application and amendment numbers. FAILURE OR YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF APPLICATIONS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR APPLICATION. If by virtue of this amendment you desire to change an application already submitted, such change may be made telegram or letter, provided each telegram or letter makes reference to the Request for Application and this amendment, and is received prior to the hour and date specified.

10. DESCRIPTION OF AMENDMENT/MODIFICATION (attach additional pages if needed)

Increase funding by \$1,479,000.00 and extend completion date of project to December 31, 2006.

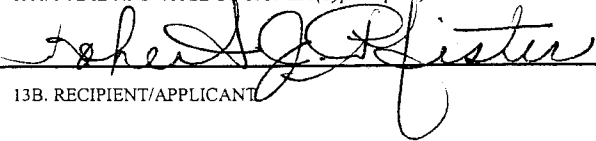
Continuation of project.

Except as provided herein, all terms and conditions of the document referenced in Item 7A or 8A above, as heretofore changed, remain unchanged and in full force and effect.

11. ACCOUNTING AND APPROPRIATION DATA (If required) FA103 2823JM PJ01 411C = \$592,000.00 FA103 2824JW PJ01 411C = \$887,000.00

12. IMPORTANT: Recipient is not, XX is required to sign this document and return 2 copies to the issuing office.

13A. NAME AND TITLE OF SIGNER (Type or print)



(Authorized Signature)

14A. NAME AND TITLE OF ASSISTANCE OFFICER (Type or print)

Lori J. Anderson, Assistance Officer

13B. RECIPIENT/APPLICANT

13C. DATE SIGNED

6/29/05

14B. UNITED STATES OF AMERICA BY



(Signature of Assistance Officer)

14C. DATE SIGNED

6/30/05

Task Order 2

Agreement Number ESA041010

National Center for Landscape Fire Analysis

University of Montana/Bureau of Land Management

July 1, 2005

INTRODUCTION

The National Center for Landscape Fire Analysis (NCLFA) at The University of Montana develops, synthesizes, and delivers scientific products, applications, and geospatial technology to improve fire and fuels management. It advances collaborative scientific research and graduate student education while improving the capabilities of natural resource professionals to provide socially desirable goods and services from forest and grassland ecosystems.

The proposed work constitutes a modification to the existing agreement "Bureau of Land Management/National Center for Landscape Fire Analysis," Agreement Number ESA041010. The request is for \$1,479,000 as detailed in the attached budget, and covers the period 1 July 2005 through 31 December 2006. It comprises Task Order No. 2 to the existing research grant.

During the previous grant period the National Center for Landscape Fire Analysis (NCLFA) at the University of Montana developed a Strategic Plan which identifies goal areas for Center activities. This proposal constitutes a statement of work within these goal areas for the period beginning 1 July 2005. Descriptions of proposed activities in the areas of *Development of Geospatial Applications*, *Institutional Research*, and *Information System Development* follow this narrative.

The proposed direction and scope of research builds on past investments and successes of the NCLFA. Notably the work continues the theme of collaborative efforts aimed at fire and natural resource managers at a variety of geographic scales. Each of the goal area activities is couched in the context of two framing documents; the Fire Center *Charter* and the Fire Center *Strategic Plan*. During the period of work the NCLFA will work with our multi-agency, multi-partner Advisory Committee to ratify the Center's Strategic Plan.

PROGRAM OF WORK

Goal Area One: Development of Geospatial Applications: Create scientifically sound, user-friendly data products that map and characterize relevant resource conditions such that managers may efficiently carry out responsibilities in wildfire suppression, fuels management, and burned-area restoration.

MODELING POST-FIRE HYDROLOGIC RESPONSE AND ROAD LINKAGES

The 19 sq. mile, 8-mile Creek Watershed is tributary to the Bitterroot River and flows from the Sapphire Mountains at the north end of the Bitterroot Valley west of Florence, Montana. The watershed has a long history of forest management and is heavily roaded, but most of this activity occurred after 1960. The USGS obtained 6 years of daily discharge data in 8-mile Creek between 1957 and 1963. Following recent land exchanges, most of the land in the 8-mile Creek watershed is owned and managed by the Plum Creek Timber Company. Multiple lightning strikes during a storm in August 2003 resulted in numerous ignitions that ultimately merged into the 26,000 acre Cooney Ridge Fire Complex. Most of the Complex was confined to the 8-mile Creek watershed and it is estimated that 60% of the standing vegetation was consumed in the fire. USFS BAER reports estimate high canopy burn severity, but little ground reconnaissance has been accomplished to estimate soil burn severity on non-federal land.

This study will employ a recently developed model, DHSVM, to model post-fire hydrologic response over a range of spatial scales. Stream gauges have been cooperatively installed in small to larger tributaries of 8-mile Creek to allow model calibration. Snow surveys will be completed by April 1. A network of tipping-bucket precipitation gauges will provide input for model validation. We intend to identify road-channel interactions with wildfire-related debris flows that are anticipated to occur this spring or early summer; and to model the role of fire and roads in altering runoff quantity/quality and in initiating gullies which link to extant stream channels.

QUANTIFICATION AND COMPARISON OF SPATIAL CHARACTERISTICS OF POST-FIRE LANDSCAPES

We will initiate a research project that utilizes the Landsat-based Normalized Burn Ratio (NBR) to investigate spatial patterns resulting from fire severity in the CCE. We will use historic Landsat Thematic Mapper (TM) and Enhanced Thematic Mapper+ (ETM+) data to derive NBR data and quantify patch, class, and landscape metrics that describe the characteristics of the post-fire landscape. These measurements will be analyzed to determine if similarities exist in pattern between fires in this region. The initial investigation will include large fires in the region that have occurred since 1984 (the temporal extent of available Landsat data), but the methods may be applied to expand the scope of the research to comparisons between fires of different regions, fuel types, and years.

The primary goals of this project are to determine if similarities exist between the severity patch characteristics of fires in the Crown of the Continent Ecosystem, and secondly, to identify the relative effects of the main driving factors behind fire behavior (fuels, weather and topography) on the composition and configuration of the post fire landscape. Several objectives must be met in order to achieve this. These include:

- Developing framework and logic for comparing fires, including choosing NBR thresholds, metrics, and sampling framework
- Analyzing all fires in the sample for similarity in the patch, class and landscape indices that are applied to the post-fire landscape
- Examining the effects of fuels, weather and topography on the chosen indices

Completion of the above objectives will result in increased knowledge of the spatial arrangement of severity patches within fires in the CCE, and a basis upon which spatially explicit information on fire severity can be integrated into management activities and research.

Goal Area 2: Institutional Research: Develop an understanding of institutional conditions and relationships that influence the effectiveness of wildfire suppression operations, fuels management projects, and the application of technology to fire management issues.

APPLICATION OF TECHNOLOGY TO FIRE MANAGEMENT ISSUES

In cooperation with the Geospatial Task Group (GTG) within the Information Resource Management (IRM) working team of the National Wildfire Coordinating Group (NWCG) the NCLFA will expand on the 2004 GIS utility study to explore two areas of critical interest: The NCLFA will initiate an incident-based investigation of geospatial product utility for the support of wildfire suppression efforts. This effort, begun in 2002, will be expanded to include on-site interviews with geospatial technicians, relevant decision-makers, and other incident based users of geospatial products (air operations, fire information officers, etc.). The goal of this activity is to articulate a comprehensive evaluation of geospatial technologies to support wildfire suppression by eliciting responses from "consumers" of those products as well as other organizational and operational areas of fire suppression such as Multi-agency Coordination (MAC) groups. This effort will also supplement the 2004 study and ensure comprehensive data collection by interviewing geospatial technicians.

UNDERSTANDING INSTITUTIONAL CONDITIONS AND RELATIONSHIPS THAT AFFECT FIRE MANAGEMENT

A goal within the NCLFA strategic plan is to obtain a description of the major structural and functional attributes of the National fire management organization and the organizational and attitudinal elements that distinguish fire management professionals from other disciplinary areas within the fire organization. An important element in achieving this organizational and structural analysis is the development of a comprehensive administrative map for fire management. This map will describe the organizational and administrative lines of authority, and a description of the functional administrative roles of agencies and individuals within this structure. Within this map particular attention will be given to the information infrastructure as it relates to geospatial data management and maintenance to serve Goal Area three (Information Systems Development). This descriptive effort will provide the basis for subsequent evaluation and analysis of the attitudinal and cultural elements that contribute to actual institutional function of fire management within fire; research and analysis that will extend to work beyond the 05 FY scope of work.

Goal Area 3: Information System Development: Develop, test, and evaluate tools to organize, transmit, and archive information necessary to fire and fuels management.

MONTANA/IDAHO AUTOMATED BURN REPORTING SYSTEM

The prescribed fire tracking and smoke management application is a computerized information system used by the Montana/Idaho Airshed Group to manage forest and rangeland prescribed fire data and enhance smoke management decisions. The NCLFA began development of this system in 2001 and it has been operational since the 2002 spring burning season. The system framework includes three principle areas of development: 1) a front-end web interface, 2) database, and 3) customized GIS application. In this new fiscal year, the NCLFA plans to develop version 2.0 of the system to enhance functionality and interoperability. Specific tasks include:

1. Migrate database from Microsoft Access to Microsoft SQL Server.
2. Migrate GIS application from ArcView to ArcGIS.
3. Integrate burn data from adjacent states of Washington and Oregon.
4. Integrate wildland fire information.
5. Develop interactive web-mapping capabilities.

Continued development of the prescribed fire tracking and smoke management application provides an opportunity for the NCLFA to test and evaluate the latest geospatial and web-based technologies while providing a pragmatic tool for fire and fuels management. The system also precipitates relationships with regional partners in the management of smoke.

DEVELOPMENT OF THE SMOKEJUMPER INFORMATION MANAGEMENT SYSTEM

The smokejumper information management system, or SUFIS, is a web-based, interagency database application that integrates tracking of smokejumper incidents and personnel at the nine bases and their satellites in the western United States. In fiscal year 2003, the NCLFA began iterative testing of a pilot application developed at the University of Montana and deploys the application experimentally for widespread smokejumper use. A critical activity in this fiscal cycle is to build a two-way training environment through a national commitment to involve smokejumpers in off-season development and testing activities on site at the NCLFA.

SUFIS provides foundation for further development of 'integrated regional fire information systems.' The application has been developed to support addition of a fire information sub-system for relatively small, initial attack fires, to complement the 209 reporting application for large fires that was developed here at the University of Montana.

PROGRAM MANAGEMENT AND PLANNING

The Center will continue to operate as an independent center of science and technology within the School of Forestry at the University of Montana. It will collaborate closely with scientists and managers within regionally based offices of the USDA Forest Service, specifically the Fire Sciences Laboratory, the Forest Science Laboratory, the Northern Regional Office, the Aerial Fire Depot, and the Northern Rockies Coordination Center. It will also sustain relationships and information sharing with the National Interagency Fire Center (NIFC) in Boise, Idaho.

The Center will operate under the direction of Dr. LLOYD Queen, Professor of Remote Sensing at the School of Forestry at the University of Montana. Dr. Queen will oversee research and technology applications as well as the coordination with other research and management partners. Collaboration with the Fire Sciences Laboratory is crucial to the success of the *Center*, thus the FSL's relationship to the Center will be a critical item of discussion during the Advisory Committee discussions.

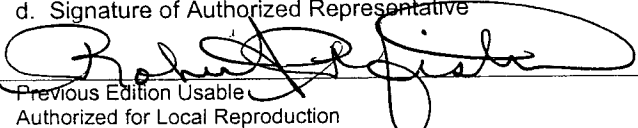
The *Center's* staffing plans will be tied to program functionality and user needs. The *Center's* Director will be responsible for program direction and guidance, and will assume overall responsibility for the scalability of *Center* projects (i.e., ensure that projects have programmatic or corporate potential). An Assistant Director will provide operational oversight for science and technology applications, and will assist in liaison with primary partners. Additional staff support will be required (although not necessarily full-time) for systems administration, programming and data support, image processing and analysis, GIS analysis, and administrative support. It is fully anticipated that faculty and graduate students at the University of Montana will be involved in research projects that are of direct interest to the *Center*. As such, these students and post-doctoral scholars will be engaged as appropriate.

At the end of the period the Fire Center will provide the following deliverables; which will serve to document the activities of the Center. A work plan proposal for each of the subsequent out years of funding will also be written prior to the completion of a given year's efforts.

1. Project Work Plans. These plans will describe activities undertaken for each of the projects within the three objectives.
2. Annual Report on Center facilities and activities.

PROGRAM REVIEW

Each year the Fire Center will conduct an internal evaluation of its projects to observe in systematic fashion the progress made within annual work plans in each goal area. Considerations within the evaluation will include, but are not limited to, cost/benefit analyses of projects; timeliness of project completion; demand for project deliverables, and external communications on the utility of Fire Center information and data products. The evaluation will also review Fire Center activities in light of other major initiatives, such as the National Fire Plan. Annual reports on the results of this evaluation and the progress made across Fire Center goal areas will be made available by September 30 of each year.

APPLICATION FOR FEDERAL ASSISTANCE		2. DATE SUBMITTED June 1, 2005		Applicant Identifier M2002-693	
1. TYPE OF SUBMISSION <i>Application</i> <i>Preapplication</i> <input type="checkbox"/> Construction <input type="checkbox"/> Construction <input checked="" type="checkbox"/> Non-Construction <input type="checkbox"/> Non-Construction		3. DATE RECEIVED BY STATE June 1, 2005		State Application Identifier	
		4. DATE RECEIVED BY FEDERAL AGENCY		Federal Identifier ESA041010	
5. APPLICANT INFORMATION					
Legal Name: The University of Montana			Organizational Unit: Forestry		
Address (Give City, County, State, and Zip code): Office of Research and Sponsored Programs, UH209 Missoula, MT 59812-4101 Missoula County			Name and telephone number of the person to be contacted on matters involving this application (Give area code) Robert Pfister - 406-243-4786 LLoyd P. Queen - 406-243-2709		
6. EMPLOYER IDENTIFICATION NUMBER (EIN): <div style="border: 1px solid black; padding: 2px; display: inline-block;"> 8 1 - 6 0 0 1 7 1 3 </div>			7. TYPE OF APPLICANT: (Enter appropriate letter in box) <div style="border: 1px solid black; padding: 2px; display: inline-block; width: 30px; text-align: center;">I</div>		
8. TYPE OF APPLICATION <input type="checkbox"/> New <input type="checkbox"/> Continuation <input checked="" type="checkbox"/> Revision If Revision, enter appropriate letter(s) in box(es): <div style="display: flex; justify-content: space-around; margin-top: 5px;"> <div style="border: 1px solid black; padding: 2px; text-align: center;">A</div> <div style="border: 1px solid black; padding: 2px; text-align: center;">C</div> </div> <div style="margin-top: 5px;"> A. Increase Award B. Decrease Award C. Increase Duration D. Decrease Duration Other (Specify) 12/31/2006 </div>			A. State H. Independent School District B. County I. State Control Instit. of Higher Learning C. Municipal J. Private University D. Township K. Indian Tribe E. Interstate L. Individual F. Intermunicipal M. Profit organization G. Special District N. Other (Specify) _____		
9. NAME OF FEDERAL AGENCY: Bureau of Land Management			11. DESCRIPTIVE TITLE OF APPLICANT'S PROJECT:		
10. CATALOG OF FEDERAL DOMESTIC ASSISTANCE NUMBER <div style="border: 1px solid black; padding: 2px; display: inline-block;"> - </div>			Continuation of a National Landscape Fire Analysis Center		
12. AREA AFFECTED BY PROJECT (Cities, counties, states, etc.) The goal of this project is to envelop a national cooperative effort to utilize fire research and technology.					
13. PROPOSED PROJECT:		14. CONGRESSIONAL DISTRICTS OF:			
Start Date 7/1/2005	End Date 12/31/2006	a. Applicant 1		b. Project 1	
15. ESTIMATED FUNDING		16. IS APPLICATION SUBJECT TO REVIEW BY STATE EXECUTIVE ORDER 12372 PROCESS?			
a. Federal	\$1,479,000	a. YES. This preapplication/application was made available to the State Executive Order 12372 Process for review on: DATE: _____ b. NO. <input checked="" type="checkbox"/> Program is not covered by E.O. 12372 <input type="checkbox"/> or Program has not been selected by State for review			
b. Applicant	\$				
c. State	\$				
d. Local	\$				
e. Other	\$				
f. Program	\$	17. IS THE APPLICANT DELINQUENT ON ANY FEDERAL DEBT? <input type="checkbox"/> YES - If "YES", attach an explanation. <input checked="" type="checkbox"/> NO			
g. TOTAL	\$1,479,000				
18. TO THE BEST OF MY KNOWLEDGE AND BELIEF, ALL DATA IN THIS APPLICATION/PREAPPLICATION ARE TRUE AND CORRECT. THE DOCUMENT HAS BEEN DULY AUTHORIZED BY THE GOVERNING BODY OF THE APPLICANT AND THE APPLICANT WILL COMPLY WITH THE ATTACHED ASSURANCES IF THE ASSISTANCE IS AWARDED.					
a. Type Name of Authorized Representative Robert Pfister		b. Title Sponsored Programs Asst. Manager		c. Telephone Number 406-243-4786	
d. Signature of Authorized Representative 				e. Date Signed 5/27/05	

BUDGET INFORMATION - Non-Construction Programs

OMB Approval No. 0348-0044

SECTION A - BUDGET SUMMARY

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		Total (g)
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	
1. fire research		\$	\$	\$ 1,479,000	\$	\$ 1,479,000
2.						
3.						
4.						
5. Totals		\$	\$	\$ 1,479,000	\$	\$ 1,479,000

SECTION B - BUDGET CATEGORIES

6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY					Total (5)
	(1)	(2)	(3)	(4)		
a. Personnel	\$ 497,236	\$	\$	\$	\$	\$ 497,236
b. Fringe Benefits	158,079					158,079
c. Travel	50,000					50,000
d. Equipment	70,000					70,000
e. Supplies	140,875					140,875
f. Contractual	130,000					130,000
g. Construction	0					0
h. Other	212,533					212,533
i. Total Direct Charges (sum of 6a-6h)	1,258,723					1,258,723
j. Indirect Charges	220,277					220,277
k. TOTALS (sum of 6i-6j)	\$ 1,479,000	\$	\$	\$	\$	\$ 1,479,000
7. Program Income	\$	\$	\$	\$	\$	\$

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Prescribed by OMB Circular A-102

Section C - Non-Federal Resources

	(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) Totals
8.		\$	\$	\$	\$
9.					
10.					
11.					
12. Total (sum of lines 8 - 11)		\$	\$	\$	\$

Section D - Forecasted Cash Needs

	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	\$ 1,479,000	\$ 369,750	\$ 369,750	\$ 369,750	\$ 369,750
14. Non-Federal					
15. Total (sum of lines 13 and 14)	\$ 1,479,000	\$ 369,750	\$ 369,750	\$ 369,750	\$ 369,750

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project

	(a) Grant Program	Future Funding Periods (Years)			
		(b) First	(c) Second	(d) Third	(e) Fourth
16.		\$	\$	\$	\$
17.					
18.					
19.					
20. Total (sum of lines 16-19)		\$	\$	\$	\$

Section F - Other Budget Information

21. Direct Charges	\$1,258,723	22. Indirect Charges	\$220,277
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23. Remarks
17.5% of Total Direct Costs per CESU Agreement

UNIV OF MONTANA:
PI:
FUNDING AGENCY:
PROJECT TITLE:

School of Forestry
Lloyd Queen
BLM
Continuation of The National Center for Landscape Fire
Analysis
5/1/05 thru 12/31/06

DURATION:

<u>Salaries</u>	<u>Effort (mo)</u>		<u>Year 5</u>
PI - Director	0.50 FTE	\$	36,197
Office Administrator	1.00 FTE	\$	29,161
Staff-Specialist - Carl	1.00 FTE	\$	52,500
Staff-Specialist - Jim	1.00 FTE	\$	52,500
Staff-Specialist - Don	1.00 FTE	\$	42,000
Staff-Specialist - Josh	1.00 FTE	\$	33,600
Staff-Specialist - Eric	1.00 FTE	\$	35,175
Staff-Specialist - Lee	1.00 FTE	\$	33,600
Staff-Specialist - Craig	1.00 FTE	\$	33,600
PH.D student stipend (2-out)	0.39 FTE	\$	38,700
PH.D student stipend (2-in)	0.39 FTE	\$	38,700
M.S. student stipend (2-out)	0.39 FTE	\$	32,096
M.S. student stipend (2-in)	0.39 FTE	\$	32,096
Student hourly	0.19 FTE	\$	7,311

Total Salary

\$497,236

Fringe

PI - Director	\$	11,271
Office Administrator	\$	14,383
Staff-Specialist	\$	22,085
Staff-Specialist	\$	22,085
Staff-Specialist	\$	18,882
Staff-Specialist	\$	16,320
Staff-Specialist	\$	16,800
Staff-Specialist	\$	16,320
Staff-Specialist	\$	16,320
PH.D student stipend (2-out)	\$	968
PH.D student stipend (2-in)	\$	968
M.S. student stipend (2-out)	\$	802
M.S. student stipend (2-in)	\$	802
Student hourly	\$	73

\$158,079

<u>Total Personnel</u>	\$	655,315
<u>Other Services</u>	\$	
Contracted Services	\$	30,000
Sub-contracts	\$	100,000
<u>Supplies</u>	\$	140,875
Printing/Photographics	\$	
<u>Communications-incl.fixed telephone costs</u>	\$	6,000
<u>Travel</u>	\$	50,000
<u>Rent</u>	\$	25,000
<u>Repair/Maint.</u>	\$	5,000
<u>Other Expenses</u>	\$	
Dues/Subscript	\$	5,000
Education & Training	\$	30,000
Meeting/Conf.	\$	30,000
Recruitment Costs	\$	0
Licenses	\$	35,000
Tuition (2/2 semesters) Ph.D. (out-state)	\$	29,516
Tuition (2/2 semesters) Ph.D. (in-state)	\$	9,867
Tuition (2/2 semesters) MS (out-state)	\$	28,399
Tuition (2/2 semesters) MS (in-state)	\$	8,751
<u>Capital Equip</u>	\$	70,000
TOTAL DIRECT COSTS	\$	1,258,723
INDIRECT COSTS @ 17.5% TDC	\$	220,277
FINAL BUDGET	\$	1,479,000